

# 110 - 112 MOUNT VERNON ROAD, MOUNT VERNON PROPOSED CHILDCARE CENTRE

## STORMWATER CONCEPT PLAN

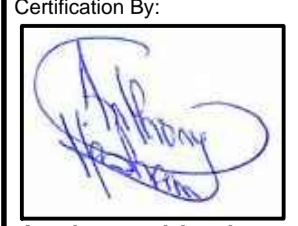



LOCALITY PLAN  
N.T.S

### DRAWING INDEX

| Drawing No.           | DESCRIPTION                          |
|-----------------------|--------------------------------------|
| ACE171195.SW.DA - 000 | COVER SHEET PLAN                     |
| ACE171195.SW.DA - 101 | STORMWATER CONCEPT PLAN GROUND LEVEL |
| ACE171195.SW.DA - 102 | WSUD TANK DETAILS SHEET 1 OF 3       |
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NOT FOR CONSTRUCTION

|   |                                   |                       |       |                 |         |                  |            |     |     |     |   |                  |            |     |     |     |   |                  |            |     |     |     |   |                                   |            |     |     |     |       |             |      |       |        |         |   |  |   |  |   |  |   |  |   |  |  |  |
|---|-----------------------------------|-----------------------|-------|-----------------|---------|------------------|------------|-----|-----|-----|---|------------------|------------|-----|-----|-----|---|------------------|------------|-----|-----|-----|---|-----------------------------------|------------|-----|-----|-----|-------|-------------|------|-------|--------|---------|---|--|---|--|---|--|---|--|---|--|--|--|
| <table border="1"> <tr> <td>D</td> <td>COUNCIL COMMENTS</td> <td>10/10/2019</td> <td>HUV</td> <td>EHZ</td> <td>JSF</td> </tr> <tr> <td>C</td> <td>COUNCIL COMMENTS</td> <td>26/03/2019</td> <td>HUV</td> <td>EHZ</td> <td>JAB</td> </tr> <tr> <td>B</td> <td>COUNCIL COMMENTS</td> <td>27/02/2018</td> <td>HUV</td> <td>JTF</td> <td>MBR</td> </tr> <tr> <td>A</td> <td>ISSUE FOR DEVELOPMENT APPLICATION</td> <td>30/11/2017</td> <td>HUV</td> <td>EHZ</td> <td>MBR</td> </tr> <tr> <td>Issue</td> <td>Description</td> <td>Date</td> <td>Drawn</td> <td>Design</td> <td>Checked</td> </tr> </table> |                                   |                       |       |                 | D       | COUNCIL COMMENTS | 10/10/2019 | HUV | EHZ | JSF | C | COUNCIL COMMENTS | 26/03/2019 | HUV | EHZ | JAB | B | COUNCIL COMMENTS | 27/02/2018 | HUV | JTF | MBR | A | ISSUE FOR DEVELOPMENT APPLICATION | 30/11/2017 | HUV | EHZ | MBR | Issue | Description | Date | Drawn | Design | Checked | Architect<br><b>Project Work Design Pty</b><br>PO Box 5138, Chittaway Bay NSW 2261<br>M : 0412 637 875<br>W : pwdesign.com.au |  | Client<br><b>Vladimir Vanovac</b><br>Council<br><b>Penrith City Council</b> |  | Scale<br>Certification By:<br><br>Anthony Hasham |  |  <b>AUSTRALIAN CONSULTING ENGINEERS.</b><br>PTY LTD - A.C.N. 084 059 941<br>SHOP 2-141 CONCORD RD NORTH STRATHFIELD NSW 2137<br>PH: (02) 9763 1500 FX: (02) 9763 1515<br>EMAIL: info@aceeng.com.au |  | Project<br><b>110 - 112 MOUNT VERNON ROAD, MOUNT VERNON<br/>PROPOSED CHILDCARE CENTRE<br/>STORMWATER CONCEPT PLAN<br/>DEVELOPMENT APPLICATION</b> |  | Drawing Title<br><b>COVER SHEET PLAN</b> |  |
| D   | COUNCIL COMMENTS                  | 10/10/2019            | HUV   | EHZ             | JSF     |                  |            |     |     |     |   |                  |            |     |     |     |   |                  |            |     |     |     |   |                                   |            |     |     |     |       |             |      |       |        |         |   |  |   |  |   |  |   |  |   |  |  |  |
| C   | COUNCIL COMMENTS                  | 26/03/2019            | HUV   | EHZ             | JAB     |                  |            |     |     |     |   |                  |            |     |     |     |   |                  |            |     |     |     |   |                                   |            |     |     |     |       |             |      |       |        |         |   |  |   |  |   |  |   |  |   |  |  |  |
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| Scale<br>N.T.S.   |                                   | Project No.<br>171195 |       | Dwg. No.<br>000 |         | Issue<br>D       |            |     |     |     |   |                  |            |     |     |     |   |                  |            |     |     |     |   |                                   |            |     |     |     |       |             |      |       |        |         |   |  |   |  |   |  |   |  |   |  |  |  |

**GENERAL NOTES**

- ALL LINES ARE TO BE Ø90 uPVC 1.0% GRADE UNLESS NOTED OTHERWISE. CHARGED LINES TO BE SEWERGRADE & SEALED.
- EXISTING SERVICES LOCATIONS SHOWN INDICATIVE ONLY. IT IS THE CONTRACTOR'S RESPONSIBILITY TO LOCATE & LEVEL ALL EXISTING SERVICES PRIOR TO THE COMMENCEMENT OF ANY EARTHWORKS.
- ALL PIPES TO HAVE MIN 150mm COVER IF LOCATED WITHIN PROPERTY.
- ALL PITS IN DRIVEWAYS TO BE 450x450 CONCRETE AND ALL PITS IN LANDSCAPED AREAS TO BE 450x450 PLASTIC.
- PITS LESS THAN 600mm DEEP MAY BE BRICK, PRECAST OR CONCRETE.
- ALL BALCONIES AND ROOFS TO BE DRAINED AND TO HAVE SAFETY OVERFLOWS IN ACCORDANCE WITH RELEVANT AUSTRALIAN STANDARDS.
- ALL EXTERNAL SLABS TO BE WATERPROOFED.
- ALL GRATES TO HAVE CHILD PROOF LOCKS.
- ALL DRAINAGE WORKS TO AVOID TREE ROOTS.
- ALL DPs TO HAVE LEAF GUARDS.
- ALL EXISTING LEVELS TO BE CONFIRMED BY BUILDER PRIOR TO CONSTRUCTION.
- ALL WORK WITHIN COUNCIL RESERVE TO BE INSPECTED BY COUNCIL PRIOR TO CONSTRUCTION.
- COUNCIL'S ISSUED FOOTWAY DESIGN LEVELS TO BE INCORPORATED INTO THE FINISHED LEVELS ONCE ISSUED BY COUNCIL.
- ALL WORK SHALL BE IN ACCORDANCE WITH B.C.A. AND A.S.3500.3.
- REFER TO LANDSCAPE ARCHITECT'S DRAWINGS FOR LANDSCAPING.
- CARE TO BE TAKEN AROUND EXISTING SEWER. STRUCTURAL ADVICE IS REQUIRED FOR SEWER PROTECTION AGAINST ADDITIONAL LOADING FROM NEW PITS, PIPES, RETAINING WALLS AND OSD BASIN WATER LEVELS.
- THE OSD BASIN / TANK IS TO BE BUILT TO THE CORRECT LEVELS & SIZE AS PER THIS DESIGN. ANY VARIATIONS ARE TO BE DONE UNDER CONSULTATION FROM OUR OFFICE ONLY. ANY AMENDMENTS WITHOUT OUR APPROVAL WOULD RESULT IN ADDITIONAL FEES FOR REDESIGN AT OC STAGE OR IF A SOLUTION CANNOT BE FOUND, RECONSTRUCTION IS REQUIRED UNDER THE CONTRACTOR'S EXPENSES.

**LEGEND**

- PROPOSED STORMWATER
- EXISTING OPTIC FIBER MAIN (FROM RECORDS)
- EXISTING WATER (FROM RECORDS)
- EXISTING POWER (FROM RECORDS)
- EXISTING TELSTRA (FROM RECORDS)
- GUTTER DOWNPIPE
- ROOF SLOPE
- Ø300 CLEANING EYE
- SURFACE FLOW ARROWS
- DESIGN SURFACE LEVEL
- EXISTING SURFACE LEVEL
- PROPOSED OSD STORAGE
- PROPOSED WSUD / BIO-RETENTION AREA / POND
- PROPOSED PERVIOUS PAVING PARKING

**TREE NOTE:**  
ALL TREES TO BE TREATED AS PER THE ARBORIST REPORT (WHERE AVAILABLE).

**PIPES NOTE:**

- Ø65 PVC @ MIN 1.0%
- Ø90 PVC @ MIN 1.0%
- Ø100 PVC @ MIN 1.0%
- Ø150 PVC @ MIN 1.0%
- Ø225 PVC @ MIN 0.5%
- Ø300 PVC @ MIN 0.4%
- UNLESS NOTED OTHERWISE

**ABSORPTION PIT CALCULATION**

| IMPERVIOUS AREA       | VOLUME REQUIRED      | VOLUME PROVIDED      |
|-----------------------|----------------------|----------------------|
| 100 m <sup>2</sup>    | 2.5 m <sup>3</sup>   | 0 m <sup>3</sup>     |
| 2481.9 m <sup>2</sup> | 62.05 m <sup>3</sup> | 65.61 m <sup>3</sup> |

**GROUND FLOOR PLAN**

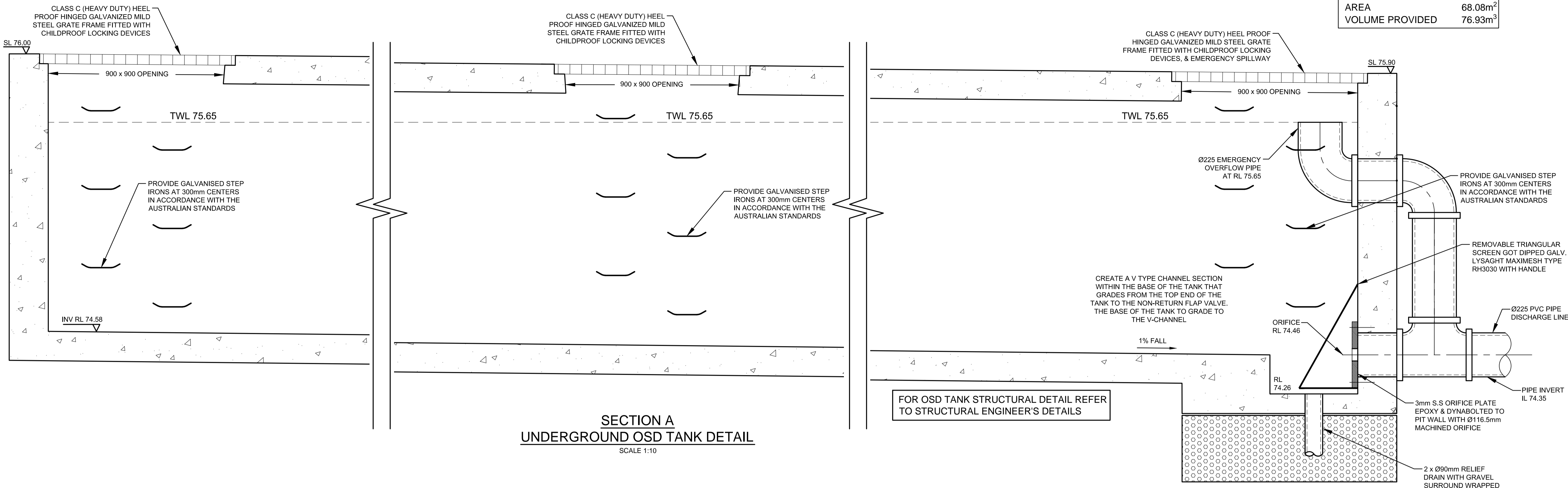
SCALE 1:200

**NOT FOR CONSTRUCTION**

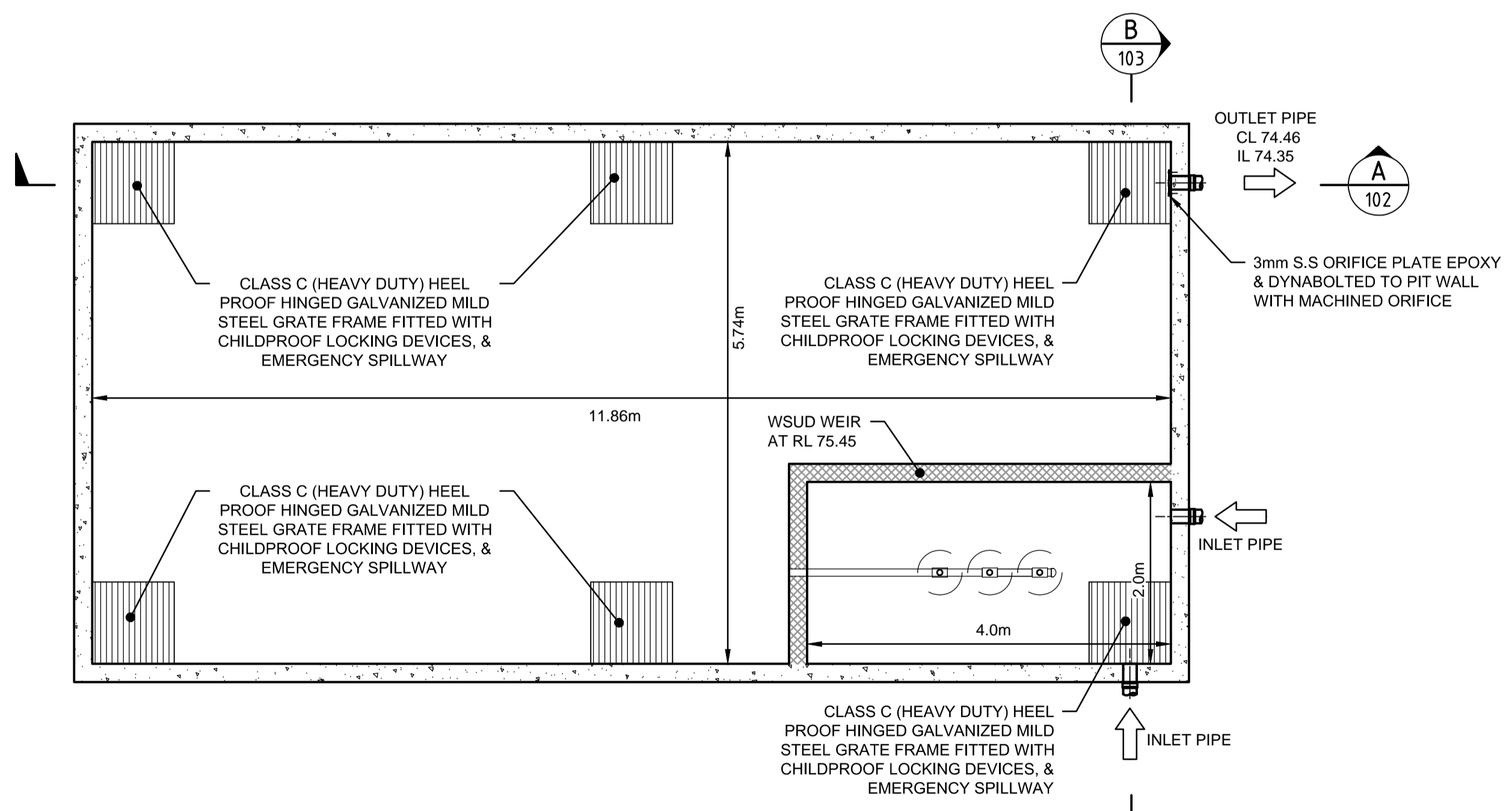
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|---|-----------------------------------|---------------------------|---------------------|----------------|---------|---------|---|------------------|------------|-----|-----|-----|---|------------------|------------|-----|-----|-----|---|------------------|------------|-----|-----|-----|---|-----------------------------------|------------|-----|-----|-----|--|--|---|--|--|---|---|
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| <p>Scale 1:200</p>  |                                   | <p>Project No. 171195</p> | <p>Dwg. No. 101</p> | <p>Issue D</p> |         |         |   |                  |            |     |     |     |   |                  |            |     |     |     |   |                  |            |     |     |     |   |                                   |            |     |     |     |  |  |   |  |  |   |   |

Document Set ID: 8968697  
Version: 1, Version Date: 18/12/2019

|                        |                     |
|------------------------|---------------------|
| <b>DETENTION TANK:</b> |                     |
| MAX TANK DEPTH         | 1.44m               |
| MIN TANK DEPTH         | 1.42m               |
| AREA                   | 68.08m <sup>2</sup> |
| VOLUME PROVIDED        | 76.93m <sup>3</sup> |



**SECTION A**  
**UNDERGROUND OSD TANK DETAIL**  
SCALE 1:10



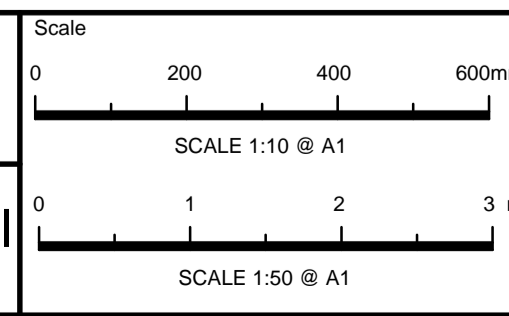
**UNDERGROUND COMBINED OSD & WSUD TANK**  
**PLAN VIEW**  
SCALE 1:50

**NOT FOR CONSTRUCTION**

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|-------|-----------------------------------|------------|-------|--------|---------|
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Architect  
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Client  
**Vladimir Vanovac**  
Council  
**Penrith City Council**



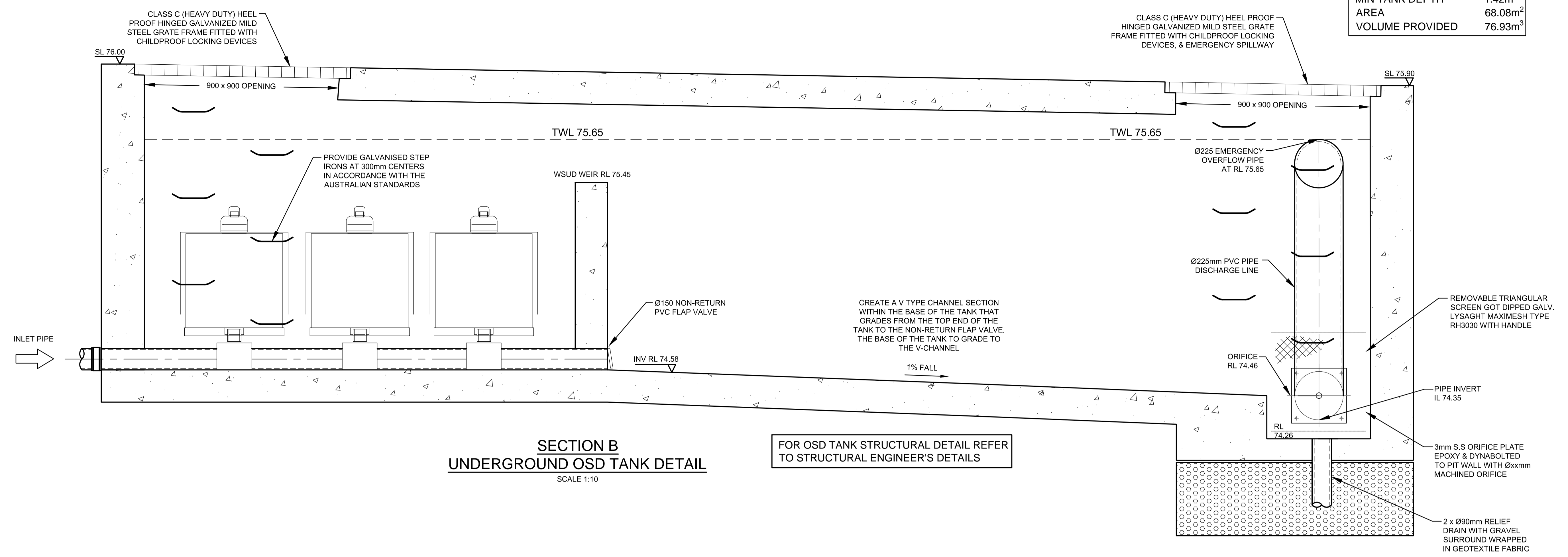
Certification By:  
*Anthony Hasham*  
**Anthony Hasham**

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Project  
**110 - 112 MOUNT VERNON ROAD, MOUNT VERNON PROPOSED CHILDCARE CENTRE STORMWATER CONCEPT PLAN DEVELOPMENT APPLICATION**

|               |    |                                       |        |
|---------------|----|---------------------------------------|--------|
| Drawing Title |    | <b>WSUD TANK DETAILS SHEET 1 OF 3</b> |        |
| Scale         | A1 | Project No.                           | 171195 |
| As Shown      |    | Dwg. No.                              | 102    |
|               |    | Issue                                 | D      |

|                        |                     |
|------------------------|---------------------|
| <b>DETENTION TANK:</b> |                     |
| MAX TANK DEPTH         | 1.44m               |
| MIN TANK DEPTH         | 1.42m               |
| AREA                   | 68.08m <sup>2</sup> |
| VOLUME PROVIDED        | 76.93m <sup>3</sup> |



**SECTION B**  
**UNDERGROUND OSD TANK DETAIL**  
SCALE 1:10

FOR OSD TANK STRUCTURAL DETAIL REFER TO STRUCTURAL ENGINEER'S DETAILS

**UNDERGROUND OSD TANK STAGED STORAGE CALCULATIONS**

| DEPTH (mm) | AREA (m <sup>2</sup> ) | CUMULATIVE VOLUME (m <sup>3</sup> ) |
|------------|------------------------|-------------------------------------|
| 0          | 68.08                  | 0                                   |
| 120        | 68.08                  | 4.0848                              |
| 200        | 68.08                  | 9.5312                              |
| 300        | 68.08                  | 16.3392                             |
| 400        | 68.08                  | 23.1472                             |
| 500        | 68.08                  | 29.9552                             |
| 600        | 68.08                  | 36.7632                             |
| 700        | 68.08                  | 43.5712                             |
| 800        | 68.08                  | 50.3792                             |
| 900        | 68.08                  | 57.1872                             |
| 1000       | 68.08                  | 63.9952                             |
| 1100       | 68.08                  | 70.8032                             |
| 1190       | 68.08                  | 76.9304                             |

**OSD CALCULATIONS:**

SITE AREA = 2616.2 m<sup>2</sup>  
= 0.26162 ha

PSD = 120 l/s/ha  
SSR = 280 m<sup>3</sup>/ha

THEREFORE:  
PSD = 120 x 0.26162 = 31.39 l/s

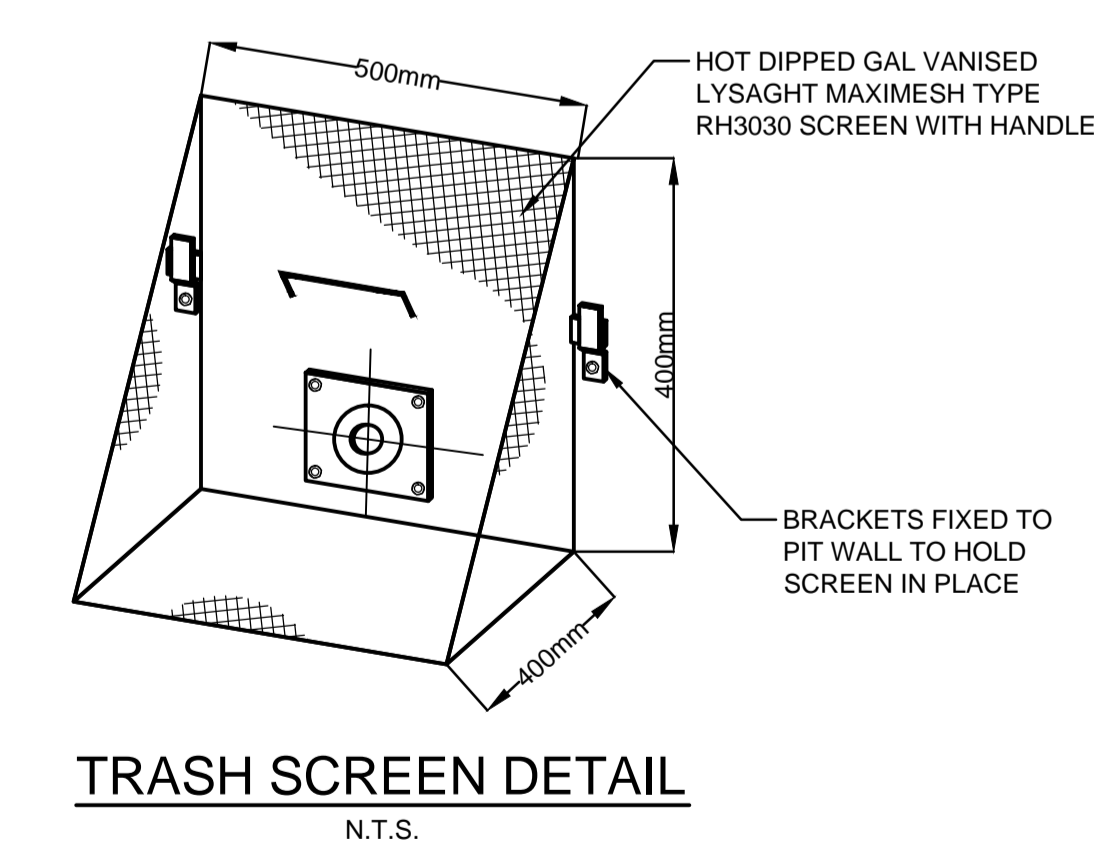
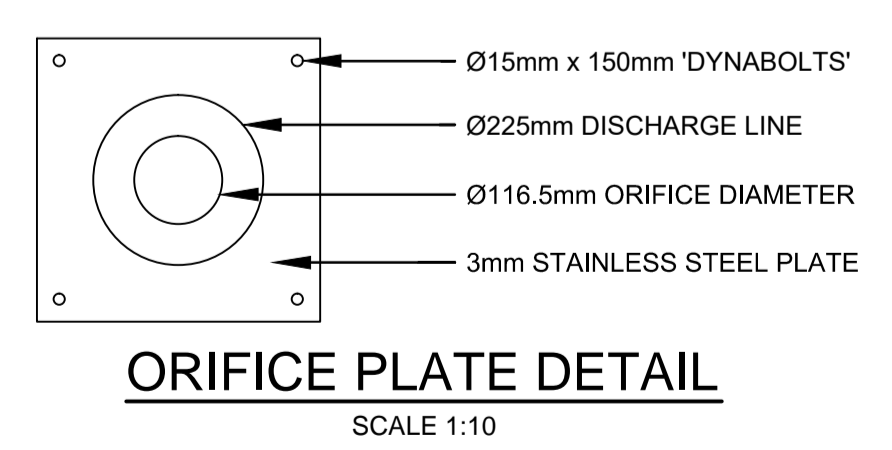
SSR = 280 x 0.26162 = 73.25 m<sup>3</sup>

**ORIFICE CALCULATIONS:**

$Q = C \times A \times (2 \times g \times h)^{0.5}$

SO:  $A = Q / (C \times \text{sqrt}(2 \times g \times h))$   
= 0.03139 / (0.61 x sqrt(2 x 9.81 x 1.19))  
= 0.01065 m<sup>2</sup>

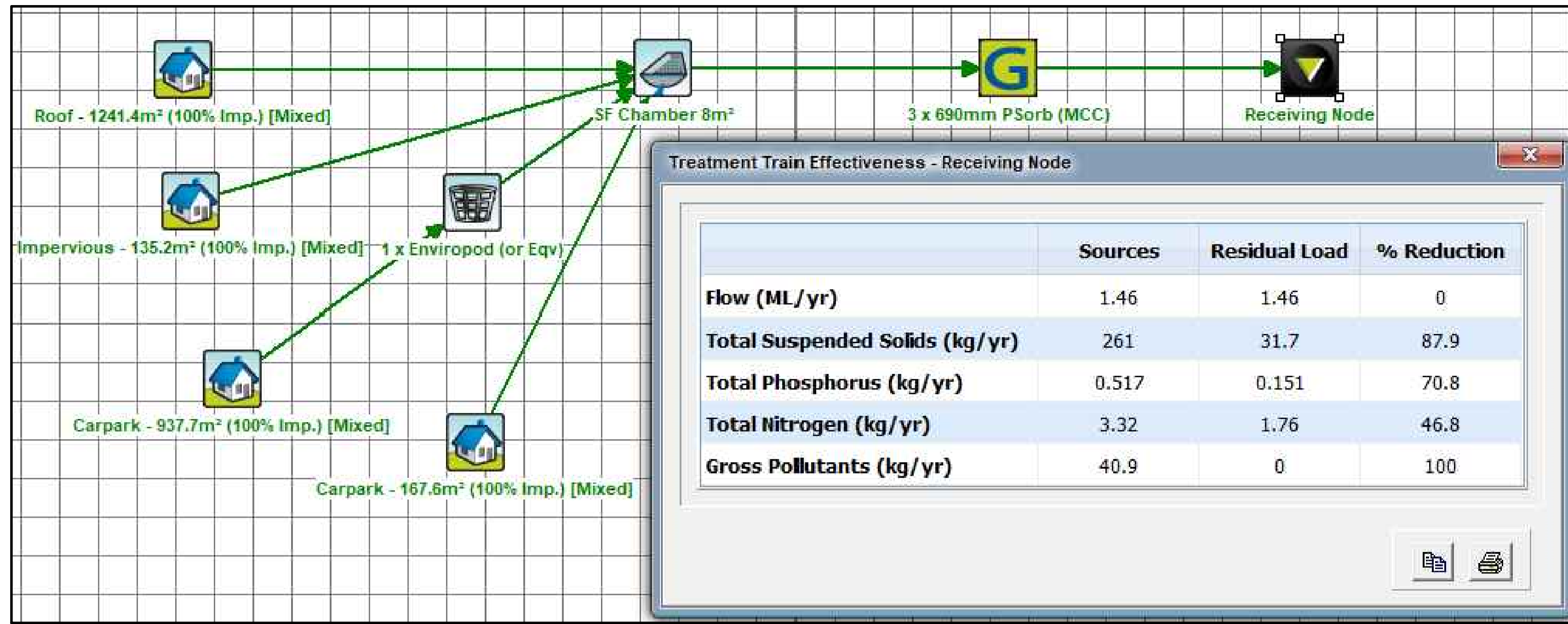
THEREFORE:  
 $d = \text{sqrt}(4 \times A / \text{pi})$   
= sqrt(4 x 0.01065 / 3.14159)  
= 116.5 mm



NOT FOR CONSTRUCTION

|  |                                   |                           |                     |                |         |     |   |                  |            |     |     |     |   |                  |            |     |     |     |   |                                   |            |     |     |     |       |             |      |       |        |         |  |  |   |   |  |   |  |
|--|-----------------------------------|---------------------------|---------------------|----------------|---------|-----|---|------------------|------------|-----|-----|-----|---|------------------|------------|-----|-----|-----|---|-----------------------------------|------------|-----|-----|-----|-------|-------------|------|-------|--------|---------|--|--|---|---|--|---|--|
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| D  | COUNCIL COMMENTS                  | 10/10/2019                | HUV                 | EZH            | JSF     |     |   |                  |            |     |     |     |   |                  |            |     |     |     |   |                                   |            |     |     |     |       |             |      |       |        |         |  |  |   |   |  |   |  |
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| <p>Scale As Shown</p>  |                                   | <p>Project No. 171195</p> | <p>Dwg. No. 103</p> | <p>Issue D</p> |         |     |   |                  |            |     |     |     |   |                  |            |     |     |     |   |                                   |            |     |     |     |       |             |      |       |        |         |  |  |   |   |  |   |  |

Document Set ID: 8968697  
Version: 1, Version Date: 18/12/2019



**WSUD MUSIC RESULTS**  
N.T.S.

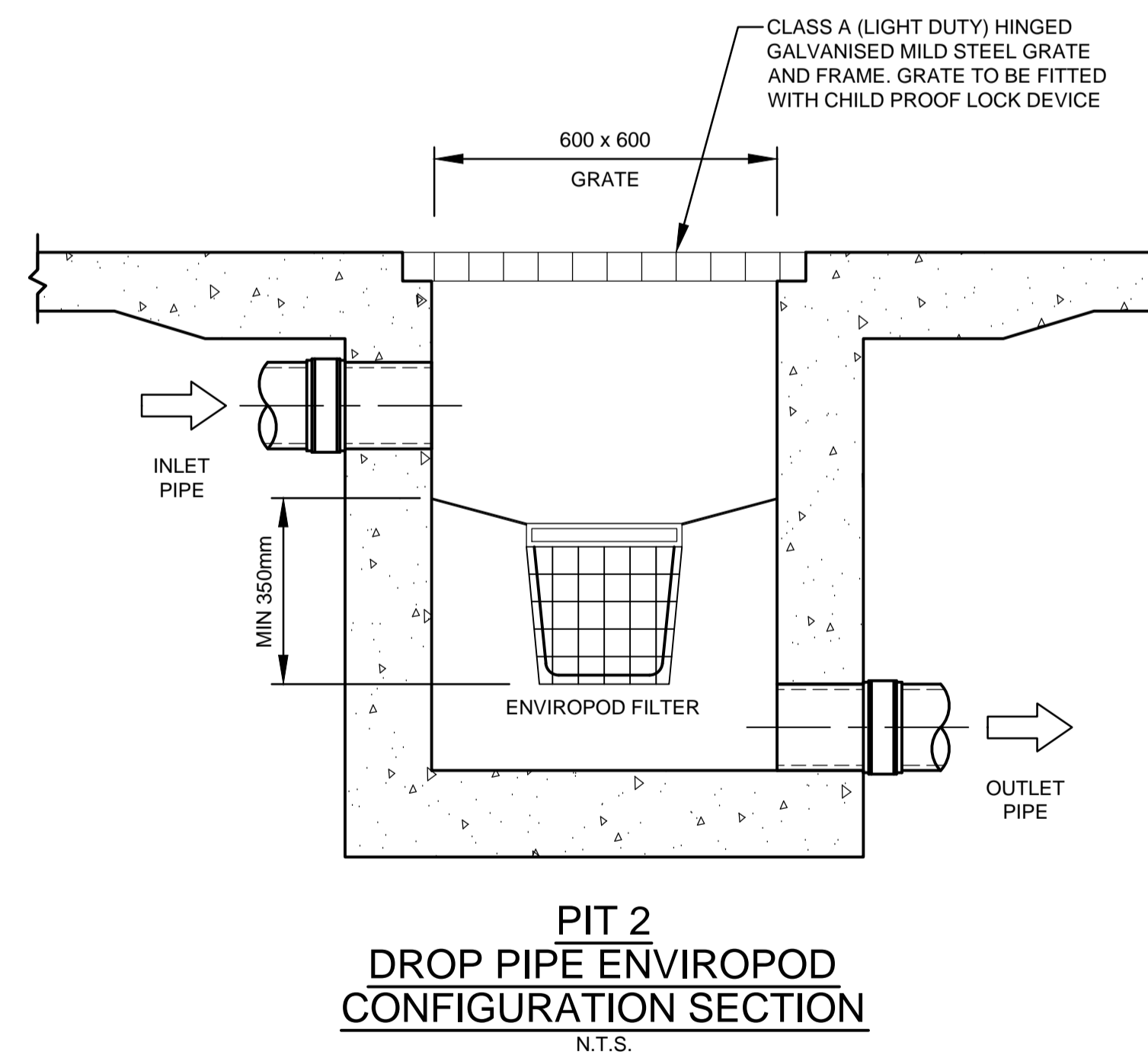
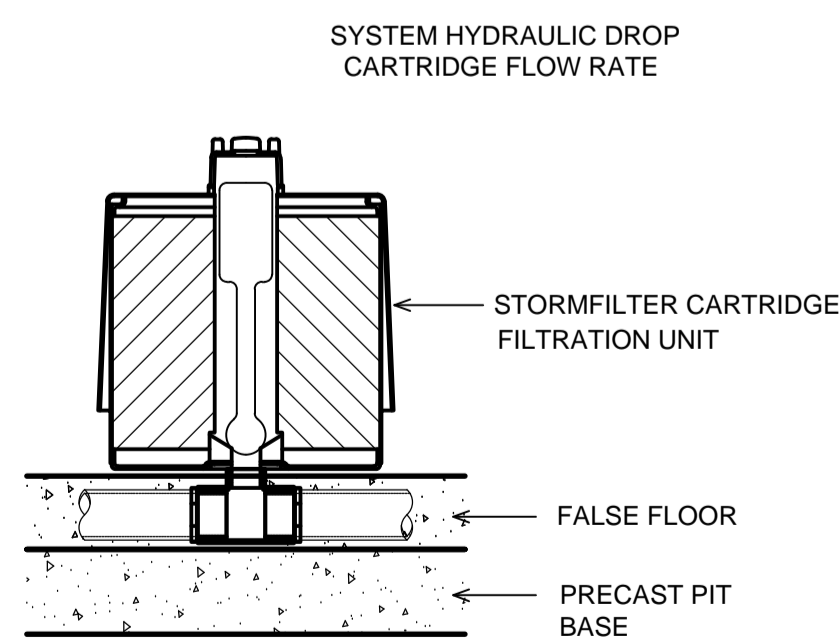
**WSUD NOTE:**

THE WSUD TANK IS TO BE BUILT TO THE CORRECT LEVELS & SIZE AS PER THIS DESIGN. ANY VARIATIONS ARE TO BE DONE UNDER CONSULTATION FROM OUR OFFICE ONLY. ANY AMENDMENTS WITHOUT OUR APPROVAL WOULD RESULT IN ADDITIONAL FEES FOR REDESIGN AT OC STAGE OR IF A SOLUTION CANNOT BE FOUND, RECONSTRUCTION IS REQUIRED UNDER THE CONTRACTOR'S EXPENSES.

**STORMFILTER DESIGN TABLE**

- STORMFILTER TREATMENT CAPACITY VARIES BY NUMBER OF FILTER CARTRIDGES INSTALLED AND BY REGION SPECIFIC INTERNAL FLOW CONTROLS. CONVEYANCE CAPACITY IS RATED AT 80L/S.
- ALL PARTS PROVIDED AND INTERNAL ASSEMBLY BY STORMWATER360 AUSTRALIA UNLESS OTHERWISE NOTED.

| CARTRIDGE HEIGHT                        | 690  |      | 460  |      | 310  |      |
|---|------|------|------|------|------|------|
| SYSTEM HYDRAULIC DROP (H - REQ'D. MIN.) | 930  |      | 700  |      | 550  |      |
| TREATMENT BY MEDIA SURFACE AREA L/S/m2  | 1.4  | 0.7  | 1.4  | 0.7  | 1.4  | 0.7  |
| CARTRIDGE FLOW RATE (L/s)               | 1.42 | 0.71 | 0.95 | 0.47 | 0.63 | 0.32 |



|  |       |          |          |
|--|-------|----------|----------|
| STRUCTURE ID                                 | 1     |          |          |
| WATER QUALITY FLOW RATE (L/S)                | -     |          |          |
| PEAK FLOW RATE (L/S)                         | -     |          |          |
| RETURN PERIOD OF PEAK FLOW (yrs)             | -     |          |          |
| # OF CARTRIDGES REQUIRED (8-22)              | 3     |          |          |
| CARTRIDGE HEIGHT (310, 460 or 690mm)         | 690   |          |          |
| MEDIA TYPE (PERLITE, PERLITE/ZEOLITE OR ZPG) | ZPG   |          |          |
| PRECAST VAULT WEIGHT                         | -     |          |          |
| PRECAST LID WEIGHT                           | -     |          |          |
| PIPE DATA:                                   | I.L.  | MATERIAL | DIAMETER |
| INLET PIPE #1                                | 74.58 | PVC      | 225      |
| INLET PIPE #2                                | 74.58 | PVC      | 225      |
| OUTLET PIPE                                  | 74.35 | PVC      | 225      |
| LADDER                                       |       |          | YES/NO   |
| ANTI-FLOTATION BALLAST                       | N/A   | N/A      |          |
|  | N/A   | N/A      |          |

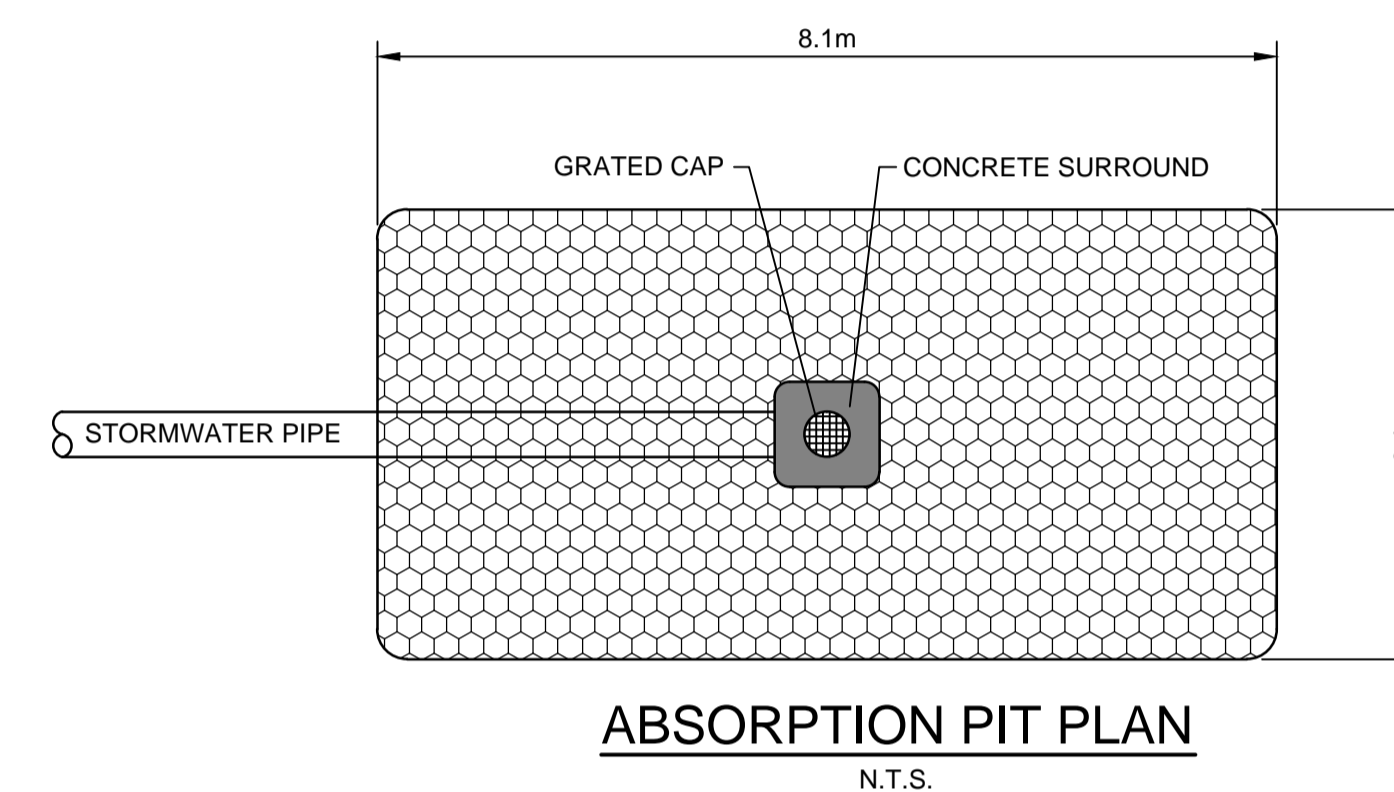
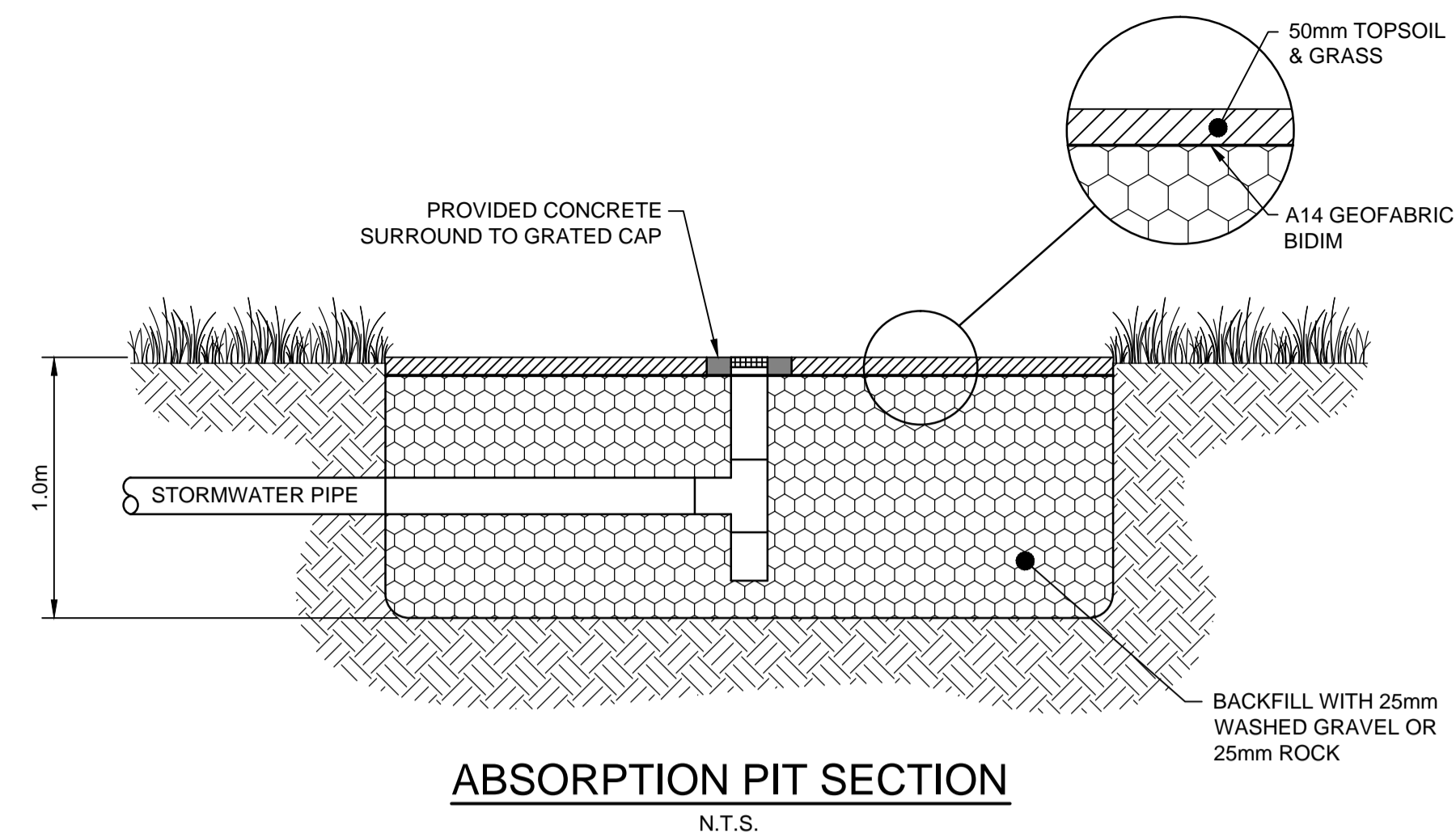
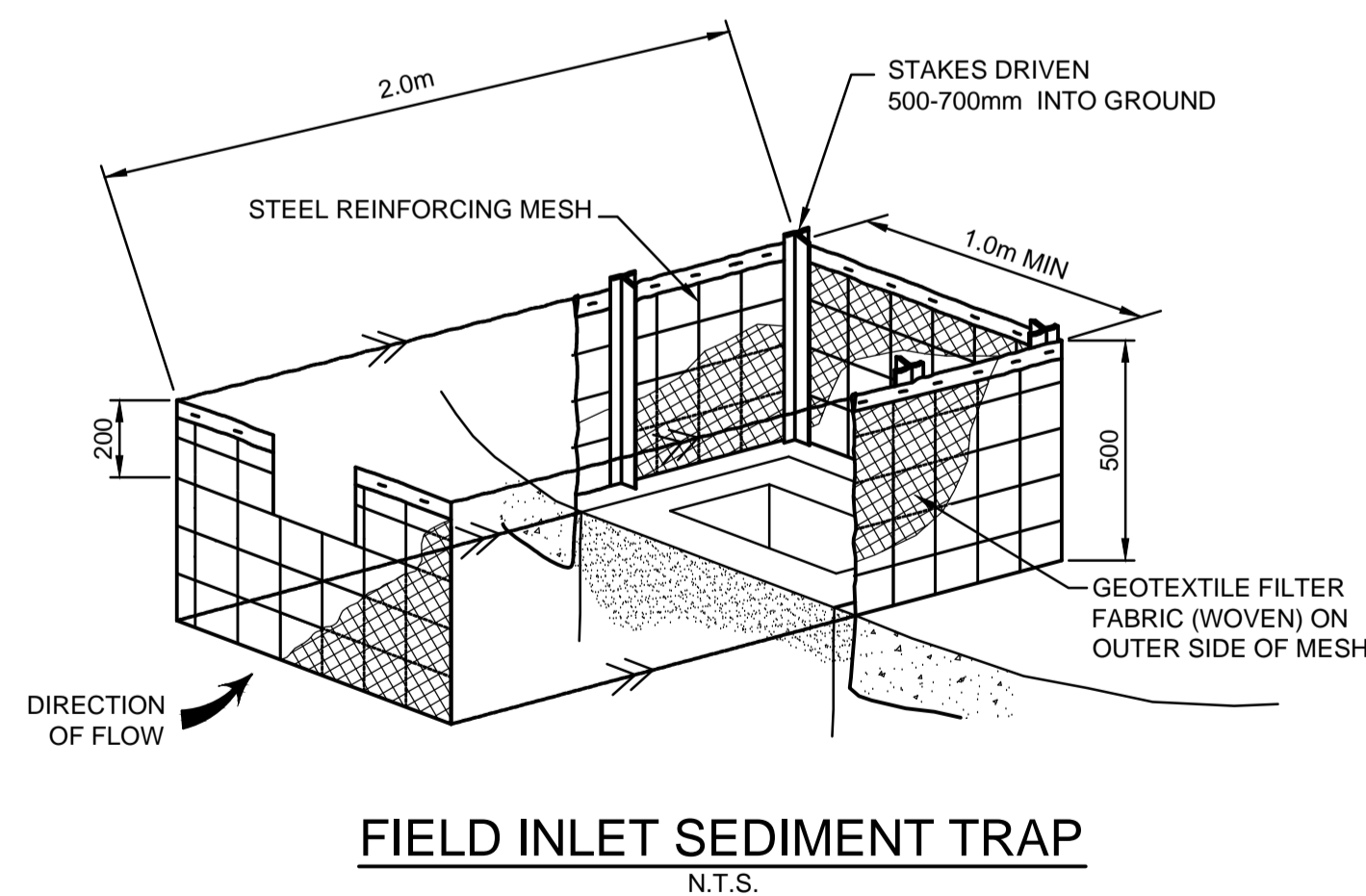
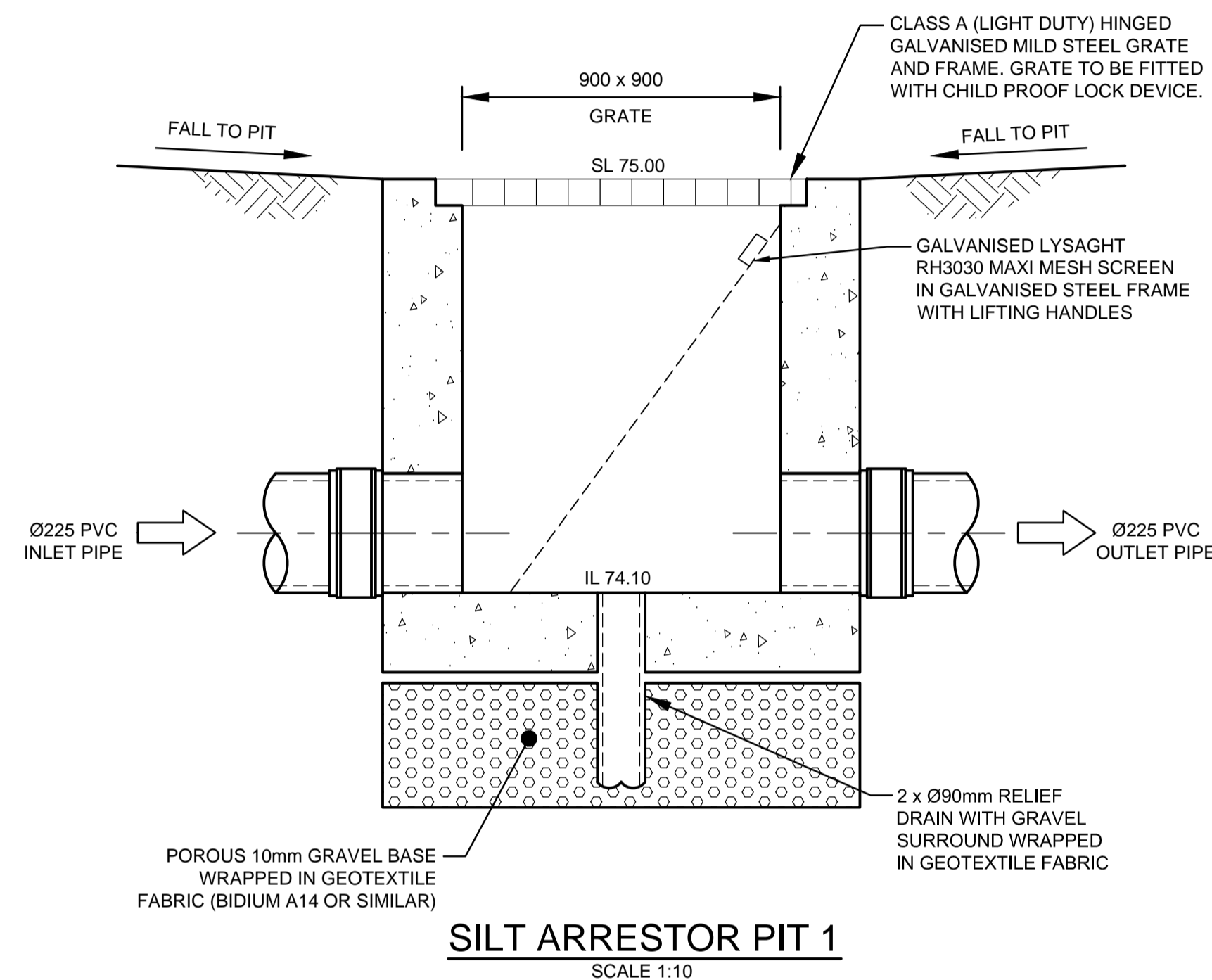
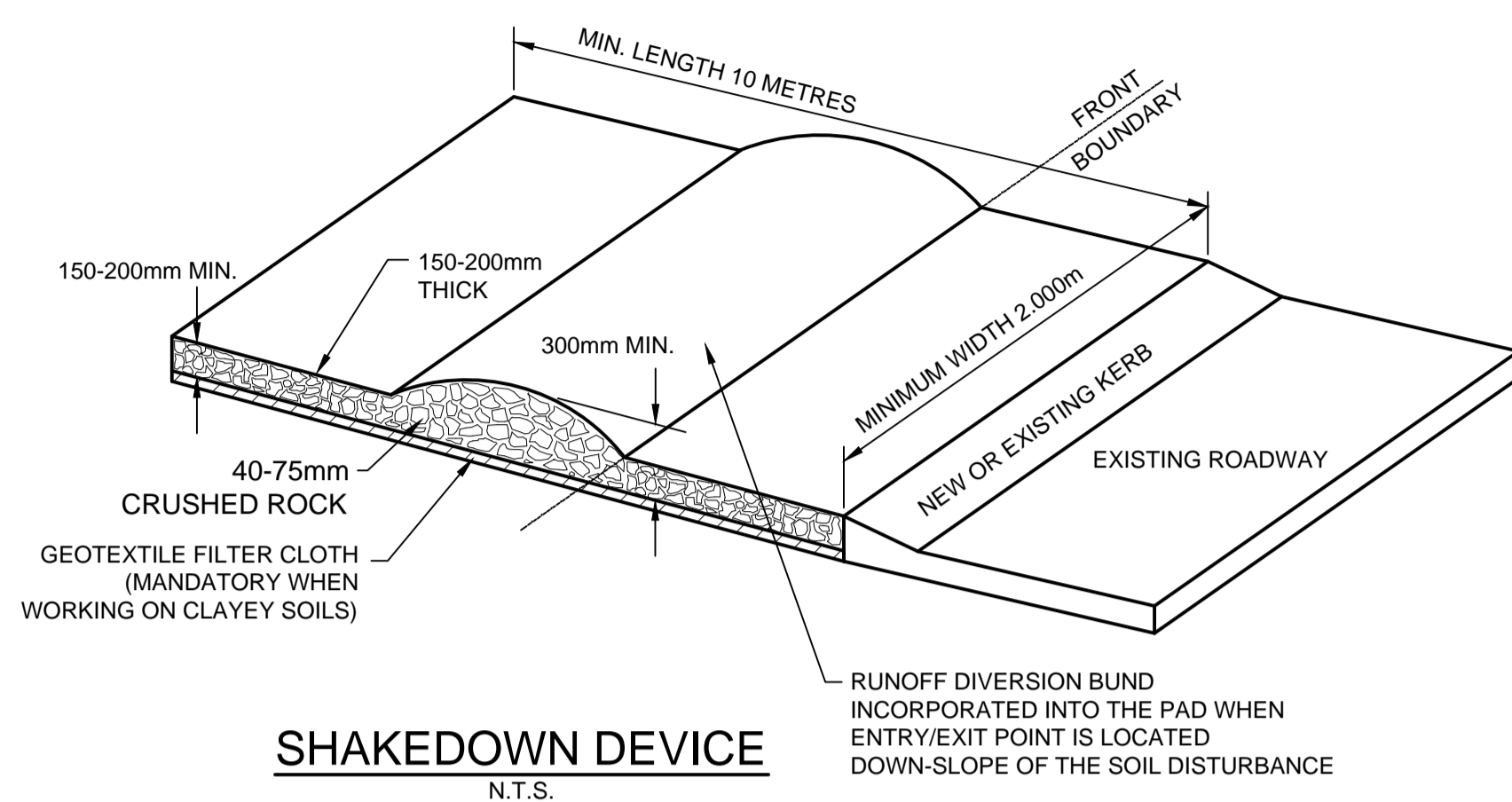
**STORMFILTER TABLE**  
N.T.S.

**GENERAL NOTES**

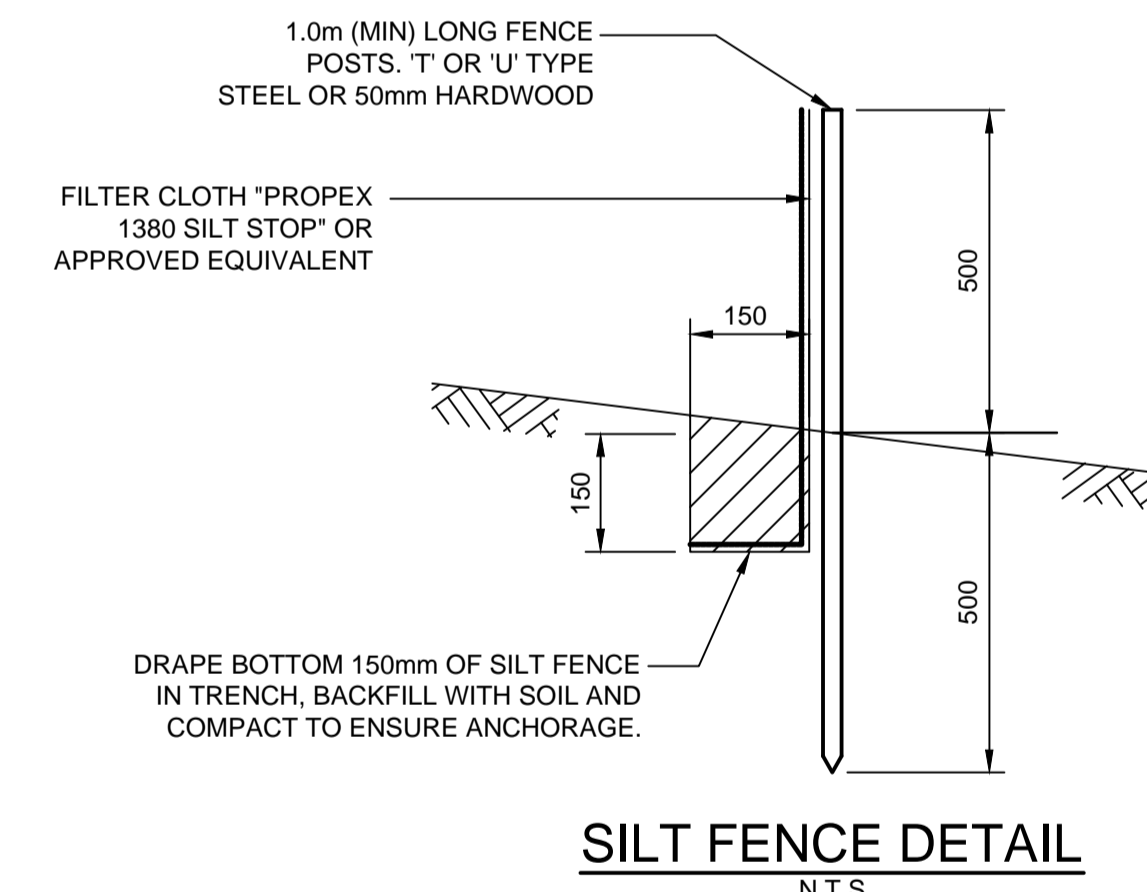
1. INLET AND OUTLET PIPING SHALL BE SPECIFIED BY SITE CIVIL ENGINEER (SEE PLANS) AND PROVIDED BY CONTRACTOR. STORMFILTER IS PROVIDED WITH OPENINGS AT INLET AND OUTLET LOCATIONS.
2. IF THE PEAK FLOW RATE, AS DETERMINED BY THE SITE CIVIL ENGINEER, EXCEEDS THE PEAK HYDRAULIC CAPACITY OF THE PRODUCT, AN UPSTREAM BYPASS STRUCTURE IS REQUIRED. PLEASE CONTACT STORMWATER360 FOR OPTIONS.
3. THE FILTER CARTRIDGE(S) ARE SIPHON-ACTUATED AND SELF-CLEANING. THE STANDARD DETAIL DRAWING SHOWS THE MAXIMUM NUMBER OF CARTRIDGES. THE ACTUAL NUMBER SHALL BE SPECIFIED BY THE SITE CIVIL ENGINEER ON SITE PLANS OR IN DATA TABLE BELOW. PRECAST STRUCTURE TO BE CONSTRUCTED IN ACCORDANCE WITH AS3600.
4. FOR SHALLOW, LOW DROP OR SPECIAL DESIGN CONSTRAINTS, CONTACT STORMWATER360 FOR DESIGN OPTIONS.
5. ALL WATER QUALITY PRODUCTS REQUIRE PERIODIC MAINTENANCE AS OUTLINED IN THE O&M GUIDELINES. PROVIDE MINIMUM CLEARANCE FOR MAINTENANCE ACCESS.
6. STRUCTURE AND ACCESS COVERS DESIGNED TO MEET AUSTRROADS T44 LOAD RATING WITH 0-2m FILL MAXIMUM.
7. THE STRUCTURE THICKNESSES SHOWN ARE FOR REPRESENTATIONAL PURPOSES AND VARY REGIONALLY.
8. ANY BACKFILL DEPTH, SUB-BASE, AND OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY SITE CIVIL ENGINEER.
9. STORMFILTER BY STORMWATER360: SYDNEY (AU) PHONE: (02) 9525 5833, BRISBANE (AU) PHONE: (07) 3272 1872.

NOT FOR CONSTRUCTION

|   |                                   |                  |            |        |         |     |   |                  |            |     |     |     |   |                  |            |     |     |     |   |                                   |            |     |     |     |       |             |      |       |        |         |  |  |  |   |  |   |   |
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| <table border="1"> <tr> <td>D</td> <td>COUNCIL COMMENTS</td> <td>10/10/2019</td> <td>HUV</td> <td>EZH</td> <td>JSF</td> </tr> <tr> <td>C</td> <td>COUNCIL COMMENTS</td> <td>26/03/2019</td> <td>HUV</td> <td>EZH</td> <td>JAB</td> </tr> <tr> <td>B</td> <td>COUNCIL COMMENTS</td> <td>27/02/2018</td> <td>HUV</td> <td>JTF</td> <td>MBR</td> </tr> <tr> <td>A</td> <td>ISSUE FOR DEVELOPMENT APPLICATION</td> <td>30/11/2017</td> <td>HUV</td> <td>EZH</td> <td>MBR</td> </tr> <tr> <td>Issue</td> <td>Description</td> <td>Date</td> <td>Drawn</td> <td>Design</td> <td>Checked</td> </tr> </table> | D                                 | COUNCIL COMMENTS | 10/10/2019 | HUV    | EZH     | JSF | C | COUNCIL COMMENTS | 26/03/2019 | HUV | EZH | JAB | B | COUNCIL COMMENTS | 27/02/2018 | HUV | JTF | MBR | A | ISSUE FOR DEVELOPMENT APPLICATION | 30/11/2017 | HUV | EZH | MBR | Issue | Description | Date | Drawn | Design | Checked | <p>Architect<br/><b>Project Work Design Pty</b><br/>PO Box 5138, Chittaway Bay NSW 2261<br/>M : 0412 637 875<br/>W : pwdesign.com.au</p> | <p>Client<br/><b>Vladimir Vanovac</b></p> <p>Council<br/><b>Penrith City Council</b></p> | <p>Scale<br/>0 200 400 600mm<br/>SCALE 1:10 @ A1</p> | <p>Certification By:<br/><i>Anthony Hasham</i><br/>ANTHONY HASHAM<br/>AUSTRALIAN CONSULTING ENGINEERS</p> | <p><b>AUSTRALIAN CONSULTING ENGINEERS.</b><br/>PTY LTD - A.C.N. 084 059 941<br/>SHOP 2-141 CONCORD RD NORTH STRATHFIELD NSW 2157<br/>PH: (02) 9763 1500 FX: (02) 9763 1515<br/>EMAIL: info@aceeng.com.au</p> | <p>Project<br/><b>110 - 112 MOUNT VERNON ROAD, MOUNT VERNON PROPOSED CHILDCARE CENTRE STORMWATER CONCEPT PLAN DEVELOPMENT APPLICATION</b></p> | <p>Drawing Title<br/><b>WSUD TANK DETAILS SHEET 3 OF 3</b></p> <p>Scale: A1<br/>As Shown</p> <p>Project No.<br/>171195</p> <p>Dwg. No.<br/>104</p> <p>Issue<br/>D</p> |
| D   | COUNCIL COMMENTS                  | 10/10/2019       | HUV        | EZH    | JSF     |     |   |                  |            |     |     |     |   |                  |            |     |     |     |   |                                   |            |     |     |     |       |             |      |       |        |         |  |  |  |   |  |   |   |
| C   | COUNCIL COMMENTS                  | 26/03/2019       | HUV        | EZH    | JAB     |     |   |                  |            |     |     |     |   |                  |            |     |     |     |   |                                   |            |     |     |     |       |             |      |       |        |         |  |  |  |   |  |   |   |
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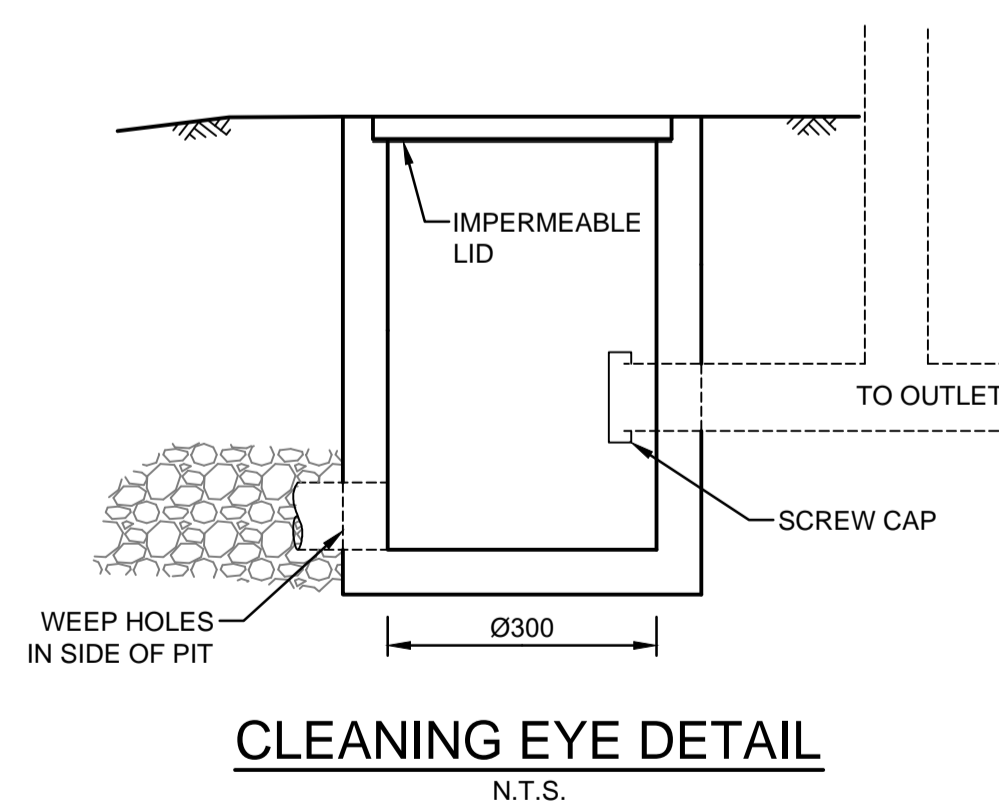


**NOTE:**  
MINIMUM 2.0m  
SETBACK FROM SIDE /  
REAR BOUNDARIES



**SILT FENCE NOTES:**

1. FILTER CLOTH TO BE FASTENED SECURELY TO POSTS WITH GALVANISED WIRE TIES, STAPLES OR ATTACHMENT BELTS.
2. POSTS SHOULD NOT BE SPACED MORE THAN 3.0m APART.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVERLAPPED BY 150mm AND FOLDED.
4. FOR EXTRA STRENGTH TO SILT FENCE, WOVEN WIRE (14mm GAUGE, 150mm MESH SPACING) TO BE FASTENED SECURELY BETWEEN FILTER CLOTH AND POSTS BY WIRE TIES OR STAPLES.
5. INSPECTIONS SHALL BE PROVIDED ON A REGULAR BASIS, ESPECIALLY AFTER RAINFALL AND EXCESSIVE SILT DEPOSITS REMOVED WHEN 'BULGES' DEVELOP IN SILT FENCE.
6. SEDIMENT FENCES SHALL BE CONSTRUCTED WITH SEDIMENT TRAPS AND EMERGENCY SPILLWAYS AT SPACINGS NO GREATER THAN 40m ON FLAT TERRAIN DECREASING TO 20m SPACINGS ON STEEP TERRAIN.



**SEDIMENT & EROSION NOTES**

1. IMMEDIATELY FOLLOWING SETTING OUT OF THE WORKS, BUT PRIOR TO COMMENCEMENT OF ANY CLEARING OR EARTHWORKS, THE CONTRACTOR AND SUPERINTENDENT SHALL WALK THE SITE TO NOMINATE THE LOCATIONS AND TYPES OF SEDIMENT AND EROSION CONTROL MEASURES TO BE ADOPTED. THESE MEASURES SHALL BE IMPLEMENTED PRIOR TO ANY CLEARING OR EARTHWORKS AND MAINTAINED UNTIL THE WORKS ARE COMPLETED AND NO LONGER POSE AN EROSION HAZARD, UNLESS OTHERWISE APPROVED BY THE SUPERINTENDENT.
2. IMMEDIATELY FOLLOWING SETTING OUT OF THE WORKS, BUT PRIOR TO COMMENCEMENT OF ANY CLEARING OR EARTHWORKS, THE CONTRACTOR AND SUPERINTENDENT SHALL WALK THE SITE TO IDENTIFY AND MARK TREES WHICH ARE TO BE PRESERVED. NOTWITHSTANDING THE ABOVE, THE CONTRACTOR SHALL TAKE ALL REASONABLE PRECAUTIONS TO MINIMISE DISTURBANCE TO EXISTING VEGETATION AND GROUND COVER OUTSIDE THE MINIMUM AREAS REQUIRED TO COMPLETE THE WORKS AND SHALL BE RESPONSIBLE FOR RECTIFICATION, AT ITS OWN COST, OF ANY DISTURBANCE BEYOND THOSE AREAS.
3. PROVIDE GULLY GRATE INLET SEDIMENT TRAPS AT ALL GULLY PITS.
4. PROVIDE SILT FENCING ALONG PROPERTY LINE AS DIRECTED BY SUPERINTENDENT.
5. ADDITIONAL CONTROL DEVICES TO BE PLACED WHERE DIRECTED BY THE PRINCIPLE.
6. ALTERNATIVE DESIGNS TO BE APPROVED BY SUPERINTENDENT PRIOR TO CONSTRUCTION.
7. WASH DOWN/RUMBLE AREA TO BE CONSTRUCTED WITH PROVISIONS RESTRICTING ALL SILT AND TRAFFICKED DEBRIS FROM ENTERING THE STORMWATER SYSTEM.
8. NO WORK OR STOCKPILING OF MATERIALS TO BE PLACED OUTSIDE OF SITE WORK BOUNDARY.
9. APPROPRIATE EROSION AND SEDIMENT CONTROLS TO BE USED TO PROTECT STOCKPILES AND MAINTAINED THROUGH OUT CONSTRUCTION.
10. IT IS THE CONTRACTORS RESPONSIBILITY TO TAKE DUE CARE OF NATURAL VEGETATION. NO CLEARING IS TO BE UNDERTAKEN WITHOUT PRIOR APPROVAL FROM THE SUPERINTENDENT.
11. TO AVOID DISTURBANCE TO EXISTING TREES, EARTHWORKS WILL BE MODIFIED AS DIRECTED ON-SITE BY THE SUPERINTENDENT.
12. THE LOCATION OF EROSION AND SEDIMENTATION CONTROLS WILL BE DETERMINED ON SITE BY THE SUPERINTENDENT.
13. ACCESS TRACKS THROUGH THE SITE WILL BE LIMITED TO THOSE DETERMINED BY THE SUPERINTENDENT AND THE CONTRACTOR PRIOR TO ANY WORK COMMENCING.
14. ALL SETTING OUT IS THE RESPONSIBILITY OF THE CONTRACTOR PRIOR TO WORKS COMMENCING ON SITE. THE SUPERINTENDENT'S SURVEYOR SHALL PEG ALL ALLOTMENT BOUNDARIES, PROVIDE COORDINATE INFORMATION TO THESE PEGS AND PLACE BENCH MARKS. THE CONTRACTOR SHALL SET OUT THE WORKS FROM AND MAINTAIN THESE PEGS.
15. PLANS ARE MINIMUM REQUIREMENTS AND ARE TO BE USED AS A GUIDE ONLY. EXACT MEASURES USED SHALL BE DETERMINED ON SITE IN CONJUNCTION WITH PROGRAM OF CONTRACTORS WORKS etc.

NOT FOR CONSTRUCTION

|                                     |             |            |       |        |         |  |  |  |   |  |  |   |                              |                        |                   |
|-------------------------------------|-------------|------------|-------|--------|---------|--|--|--|---|--|--|---|------------------------------|------------------------|-------------------|
| D COUNCIL COMMENTS                  |             | 10/10/2019 | HUV   | EHZ    | JSF     | <b>Project Work Design Pty</b><br>PO Box 5138, Chittaway Bay NSW 2261<br>M : 0412 637 875<br>W : pwdesign.com.au | <b>Client</b><br>Vladimir Vanovac<br>Council<br>Penrith City Council | <b>Scale</b><br>0 200 400 600mm<br>SCALE 1:10 @ A1 | <b>Certification By:</b><br>Anthony Hasham<br>AUSTRALIAN CONSULTING ENGINEERS | <b>AUSTRALIAN CONSULTING ENGINEERS.</b><br>P T Y L T D A C N 0 8 4 0 5 9 9 4 1<br>SHOP 2/4/4 CONCORD RD NORTH STRATHFIELD NSW 2157<br>PH (02) 9763 1500 FX (02) 9763 1515<br>EMAIL: info@aceeng.com.au | <b>Project</b><br>110 - 112 MOUNT VERNON ROAD, MOUNT VERNON<br>PROPOSED CHILDCARE CENTRE<br>STORMWATER CONCEPT PLAN<br>DEVELOPMENT APPLICATION | <b>Drawing Title</b><br>MISCELLANEOUS DETAILS SHEET |                              |                        |                   |
| C COUNCIL COMMENTS                  |             | 26/03/2019 | HUV   | EHZ    | JAB     |  |  |  |   |  |  |   |                              |                        |                   |
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| A ISSUE FOR DEVELOPMENT APPLICATION |             | 30/11/2017 | HUV   | EHZ    | MBR     |  |  |  |   |  |  |   |                              |                        |                   |
| Issue                               | Description | Date       | Drawn | Design | Checked |  |  |  |   |  |  | <b>Scale</b><br>As Shown                            | <b>Project No.</b><br>171195 | <b>Dwg. No.</b><br>105 | <b>Issue</b><br>D |



**OCEAN**  
**P R O T E C T**

OceanGuard™

## Operations & Maintenance Manual

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**Rev: 1 Last Updated: March 2019**



## Introduction

The primary purpose of stormwater treatment devices is to capture and prevent pollutants from entering waterways, maintenance is a critical component of ensuring the ongoing effectiveness of this process. The specific requirements and frequency for maintenance depends on the treatment device and pollutant load characteristics of each site. This manual has been designed to provide details on the cleaning and maintenance processes as recommended by the manufacturer.

The OceanGuard technology is a gully pit basket designed to fit within new and existing gully pits to remove pollution from stormwater runoff. The system has a choice of Filtration liners, designed to remove gross pollutants, total suspended solids and attached pollutants as either a standalone technology or as part of a treatment train with our StormFilter or Jellyfish Filtration products. OceanGuard pit baskets are highly effective, easy to install and simple to maintain.

### Why do I need to perform maintenance?

Adhering to the maintenance schedule of each stormwater treatment device is essential to ensuring that it functions properly throughout its design life.

During each inspection and clean, details of the mass, volume and type of material that has been collected by the device should be recorded. This data will assist with the revision of future management plans and help determine maintenance interval frequency. It is also essential that qualified and experienced personnel carry out all maintenance (including inspections, recording and reporting) in a systematic manner.

Maintenance of your stormwater management system is essential to ensuring ongoing at-source control of stormwater pollution. Maintenance also helps prevent structural failures (e.g. prevents blocked outlets) and aesthetic failures (e.g. debris build up), but most of all ensures the long term effective operation of the OceanGuard.

## Health and Safety

Access to pits containing an OceanGuard typically requires removing (heavy) access covers/grates, but typically it is not necessary to enter into a confined space. Pollutants collected by the OceanGuard will vary depending on the nature of your site. There is potential for these materials to be harmful. For example, sediments may contain heavy metals, carcinogenic substances or sharp objects such as broken glass and syringes. For these reasons, there should be no primary contact with the waste collect and all aspects of maintaining and cleaning your OceanGuard require careful adherence to Occupational Health and Safety (OH&S) guidelines.

It is important to note that the same level of care needs to be taken to ensure the safety of non-work personnel, as a result it may be necessary to employ traffic/pedestrian control measures when the device is situated in, or near areas with high vehicular/pedestrian activity.

### Personnel health and safety

Whilst performing maintenance on the OceanGuard pit insert, precautions should be taken in order to minimise (or when possible prevent) contact with sediment and other captured pollutants by maintenance personnel. In order to achieve this the following personal protective equipment (PPE) is recommended:

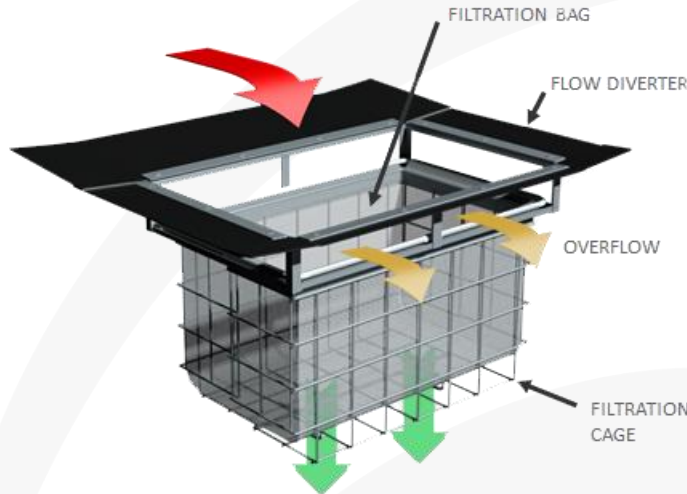
- Puncture resistant gloves
- Steel capped safety boots,
- Long sleeve clothing, overalls or similar skin protection
- Eye protection
- High visibility clothing or vest

During maintenance activities it may be necessary to implement traffic control measures. Ocean Protect recommend that a separate site specific traffic control plan is implemented as required to meet the relevant governing authority guidelines.

The OceanGuard pit insert is designed to be maintained from surface level, without the need to enter the pit. However depending on the installation configuration, location and site specific maintenance requirements it may be necessary to enter a confined space occasionally. It is recommended that all maintenance personnel evaluate their own needs for confined space entry and compliance with relevant industry regulations and guidelines. Ocean Protect maintenance personnel are fully trained and carry certification for confined space entry.

## How does it Work?

OceanGuard is designed to intercept stormwater as it enters the stormwater pits throughout a site. The OceanGuard has diversion panels that sit flush with the pit walls, this ensures that as stormwater enters at the top of the pit it is directed to the middle of the insert where the Filtration bag is situated. The filtration bag allows for screening to occur removing 100% of pollutants greater than the opening of the filtration material (200micron, 1600micron bags available).



During larger rain events the large flows overflow slots in the flow diverter of the OceanGuard ensure that the conveyance of stormwater is not impeded thus eliminating the potential for surface flooding. As the flow subsides, the captured pollutants are held in the OceanGuard Filtration bag dry. The waste then starts to dry which reduces the magnitude of organic material decomposition transitioning between maintenance intervals.

## Maintenance Procedures

To ensure that each OceanGuard pit insert achieves optimal performance, it is advisable that regular maintenance is performed. Typically the OceanGuard requires 2-4 minor services annually, pending the outcome of these inspections additional maintenance servicing may be required.

### Primary Types of Maintenance

The table below outlines the primary types of maintenance activities that typically take place as part of an ongoing maintenance schedule for the OceanGuard.

|               | Description of Typical Activities   | Frequency          |
|---------------|---|--------------------|
| Minor Service | Filter bag inspection and evaluation<br>Removal of capture pollutants<br>Disposal of material | 2-4 Times Annually |
| Major Service | Filter Bag Replacement<br>Support frame rectification   | As required        |

Maintenance requirements and frequencies are dependent on the pollutant load characteristics of each site. The frequencies provided in this document represent what the manufacturer considers to be best practice to ensure the continuing operation of the device is in line with the original design specification.

### Minor Service

This service is designed to return the OceanGuard device back to optimal operating performance. This type of service can be undertaken either by hand or with the assistance of a Vacuum unit.

### Hand Maintenance

1. Establish a safe working area around the pit insert
2. Remove access cover/grate
3. Use two lifting hooks to remove the filtration bag
4. Empty the contents of the filtration bag into a disposal container
5. Inspect and evaluate the filtration bag
6. Inspect and evaluate remaining OceanGuard components (i.e. flow diverter, filtration cage and supporting frame)
7. Rejuvenate filtration bag by removing pollutant build up with a stiff brush, additionally the filtration bag can be washed using high pressure water
8. Re-install filtration bag and replace access cover/grate

### Vacuum Maintenance

1. Establish a safe working area around the pit insert
2. Remove access cover/grate
3. Vacuum captured pollutants from the filtration bag
4. Remove filtration bag
5. Inspect and evaluate the filtration bag
6. Inspect and evaluate remaining OceanGuard components (i.e. flow diverter, filtration cage and supporting frame)
7. Rejuvenate filtration bag by removing pollutant build up with a stiff brush, additionally the filtration bag can be washed using high pressure water
8. Re-install filtration bag and replace access cover/grate

### Major Service (Filter Bag Replacement)

For the OceanGuard system, a major service is a reactionary process based on the outcomes from the minor service.

| Trigger Event from Minor Service         | Maintenance Action   |
|--|--|
| Filtration bag inspection reveals damage | Replace the filtration bag <sup>[1]</sup>                                      |
| Component inspection reveals damage      | Perform rectification works and if necessary replace components <sup>[1]</sup> |

[1] Replacement filtration bags and components are available for purchase from Ocean Protect.

## Additional Reasons of Maintenance

Occasionally, events on site can make it necessary to perform additional maintenance to ensure the continuing performance of the device.

### Hazardous Material Spill

If there is a spill event on site, all OceanGuard pits that potentially received flow should be inspected and cleaned. Specifically all captured pollutants from within the filtration bag should be removed and disposed in accordance with any additional requirements that may relate to the type of spill event. All filtration bags should be rejuvenated (replaced if required) and re-installed.

### Blockages

The OceanGuards internal high flow bypass functionality is designed to minimise the potential of blockages/flooding. In the unlikely event that flooding occurs around the stormwater pit the following steps should be undertaken to assist in diagnosing the issue and implementing the appropriate response.

1. Inspect the OceanGuard flow diverter, ensuring that they are free of debris and pollutants
2. Perform a minor service on the OceanGuard
3. Remove the OceanGuard insert to access the pit and inspect both the inlet and outlet pipes, ensuring they are free of debris and pollutants

### Major Storms and Flooding

In addition to the scheduled activities, it is important to inspect the condition of the OceanGuard pit insert after a major storm event. The inspection should focus on checking for damage and higher than normal sediment accumulation that may result from localised erosion. Where necessary damaged components should be replaced and accumulated pollutants disposed.

### Disposal of Waste Materials

The accumulated pollutants found in the OceanGuard must be handled and disposed of in a manner that is in accordance with all applicable waste disposal regulations. When scheduling maintenance, consideration must be made for the disposal of solid and liquid wastes. If the filtration bag has been contaminated with any unusual substance, there may be additional special handling and disposal methods required to comply with relevant government/authority/industry regulations.

## Maintenance Services

With over a decade and a half of maintenance experience Ocean Protect has developed a systematic approach to inspecting, cleaning and maintaining a wide variety of stormwater treatment devices. Our fully trained and professional staff are familiar with the characteristics of each type of system, and the processes required to ensure its optimal performance.

Ocean Protect has several stormwater maintenance service options available to help ensure that your stormwater device functions properly throughout its design life. In the case of our OceanGuard system we offer long term pay-as-you-go contracts, pre-paid once off servicing and replacement filter bags.

For more information please visit [www.OceanProtect.com.au](http://www.OceanProtect.com.au)



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StormFilter

Operations & Maintenance Manual

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## Introduction

The primary purpose of stormwater treatment devices is to capture and prevent pollutants from entering waterways, maintenance is a critical component of ensuring the ongoing effectiveness of this process. The specific requirements and frequency for maintenance depends on the treatment device and pollutant load characteristics of each site. This manual has been designed to provide details on the cleaning and maintenance processes for the StormFilter as recommended by the manufacturer.

The StormFilter is designed and sized to meet stringent regulatory requirements. It removes the most challenging target pollutants (including fine solids, soluble heavy metals, oil, and soluble nutrients) using a variety of media. For more than two decades, StormFilter has helped clients meet their regulatory needs and, through ongoing product enhancements, the design continues to be refined for ease of use and improved performance.

### Why do I need to perform maintenance?

Adhering to the inspection and maintenance schedule of each stormwater treatment device is essential to ensuring that it functions properly throughout its design life.

During each inspection and clean, details of the mass, volume and type of material that has been collected by the device should be recorded. This data will assist with the revision of future management plans and help determine maintenance interval frequency. It is also essential that qualified and experienced personnel carry out all maintenance (including inspections, recording and reporting) in a systematic manner.

Maintenance of your stormwater management system is essential to ensuring ongoing at-source control of stormwater pollution. Maintenance also helps prevent structural failures (e.g. prevents blocked outlets) and aesthetic failures (e.g. debris build up), but most of all ensures the long term effective operation of the StormFilter.



## Health and Safety

Access to a StormFilter unit requires removing heavy access covers/grates, and it is necessary to enter into a confined space. Pollutants collected by the StormFilter will vary depending on the nature of your site. There is potential for these materials to be harmful. For example, sediments may contain heavy metals, carcinogenic substances or objects such as broken glass and syringes. For these reasons, all aspects of maintaining and cleaning your StormFilter require careful adherence to Occupational Health and Safety (OH&S) guidelines.

It is important to note that the same level of care needs to be taken to ensure the safety of non-work personnel. As a result, it may be necessary to employ traffic/pedestrian control measures when the device is situated in, or near areas with high vehicular/pedestrian activity.

### Personnel health and safety

Whilst performing maintenance on the StormFilter, precautions should be taken in order to minimise (or, if possible, prevent) contact with sediment and other captured pollutants by maintenance personnel. The following personal protective equipment (PPE) is subsequently recommended:

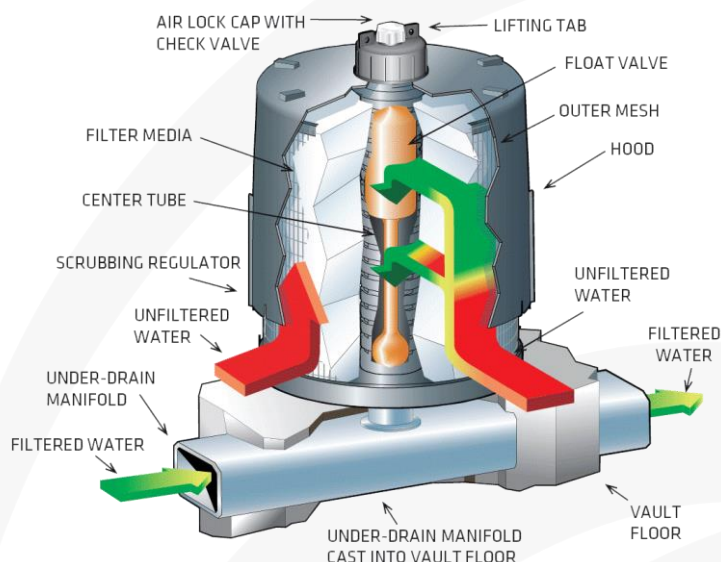
- Puncture resistant gloves
- Steel capped safety boots
- Long sleeve clothing, overalls or similar skin protection
- Eye protection
- High visibility clothing or vest

During maintenance activities, it may be necessary to implement traffic control measures. Ocean Protect recommend that a separate site-specific traffic control plan is implemented as required to meet the relevant governing authority guidelines.

Whilst some aspects of StormFilter maintenance can be performed from surface level, there will be a need to enter the StormFilter system (confined space) during a major service. It is recommended that all maintenance personnel evaluate their own needs for confined space entry and compliance with relevant industry regulations and guidelines. Ocean Protect maintenance personnel are fully trained and carry certification for confined space entry applications.

## How does it Work?

Stormwater enters the cartridge chamber, passes through the filtration media and begins filling the cartridge center tube. When water reaches the top of the cartridge the float valve opens and filtered water is allowed to drain at the designed flow rate. Simultaneously, a one-way check valve closes activating a siphon that draws stormwater evenly throughout the filter media and into the center tube. Treated stormwater is then able to discharge out of the system through the underdrain manifold pipework.



As the rain event subsides, the water level outside the cartridge drops and approaches the bottom of the hood, air rushes through the scrubbing regulators releasing the water column and breaking the siphon. The turbulent bubbling action agitates the surface of the cartridge promoting trapped sediment to drop to the chamber floor. After a rain event, the chamber is able to drain dry by way of an imperfect seal at the base of the float valve.

## Maintenance Procedures

To ensure optimal performance, it is advisable that regular maintenance is performed. Typically, the StormFilter requires an inspection every 6 months with a minor service at 12 months. Additionally, as the StormFilter cartridges capture pollutants the media will eventually become occluded and require replacement (expected media life is 1-3 years).

### Primary Types of Maintenance

The table below outlines the primary types of maintenance activities that typically take place as part of an ongoing maintenance schedule for the StormFilter.

|                      | Description of Typical Activities   | Frequency       |
|----------------------|---|-----------------|
| <b>Inspection</b>    | Visual Inspection of cartridges & chamber<br>Remove larger gross pollutants<br>Perform minimal rectification works (if required)      | Every 6 Months  |
| <b>Minor Service</b> | Evaluation of cartridges and media<br>Removal of accumulated sediment (if required)<br>Wash-down of StormFilter chamber (if required) | Every 12 Months |
| <b>Major Service</b> | Replacement of StormFilter cartridge media  | As required     |

Maintenance requirements and frequencies are dependent on the pollutant load characteristics of each site. The frequencies provided in this document represent what the manufacturer considers to be best practice to ensure the continuing operation of the device is in line with the original design specification.

## Inspection

The purpose of the inspecting the StormFilter system is to assess the condition of the StormFilter chamber and cartridges. When inspecting the chamber, particular attention should be taken to ensure all cartridges are firmly connected to the connectors. It is also an optimal opportunity to remove larger gross pollutants and inspect the outlet side of the StormFilter weir.

## Minor Service

This service is designed to ensure the ongoing operational effectiveness of the StormFilter system, whilst assessing the condition of the cartridge media.

1. Establish a safe working area around the access point(s)
2. Remove access cover(s)
3. Evaluate StormFilter cartridge media (if exhausted schedule major service within 6 months)
4. Measure and record the level of accumulated sediment in the chamber (if sediment depth is less than 100 mm skip to step 9)
5. Remove StormFilter cartridges from the chamber
6. Use vacuum unit to removed accumulated sediment and pollutants in the chamber
7. Use high pressure water to clean StormFilter chamber
8. Re-install StormFilter cartridges
9. Replace access cover(s)

## Major Service (Filter Cartridge Replacement)

For the StormFilter system a major service is reactionary process based on the outcomes from the minor service, specifically the evaluation of the cartridge media.

| Trigger Event                               | Maintenance Action                                 |
|---|--|
| Cartridge media is exhausted <sup>[1]</sup> | Replace StormFilter cartridge media <sup>[2]</sup> |

[1] Multiple assessment methods are available, contact Ocean Protect for assistance

[2] Replacement filter media and components are available for purchase from Ocean Protect.

This service is designed to return the StormFilter device back to optimal operating performance

1. Establish a safe working area around the access point(s)
2. Remove access cover(s)
3. By first removing the head cap, remove each individual cartridge hood to allow access to the exhausted media.
4. Utilise a vacuum unit to remove exhausted media from each cartridge
5. Use vacuum unit to remove accumulated sediment and pollutants in the chamber
6. Use high pressure water to clean StormFilter chamber
7. Inspect each empty StormFilter cartridges for any damage, rectify damage as required
8. Re-fill each cartridge with media in line with project specifications
9. Re-install replenished StormFilter cartridges
10. Replace access cover(s)

## Additional Types of Maintenance

Occasionally, events on site can make it necessary to perform additional maintenance to ensure the continuing performance of the device.

### Hazardous Material Spill

If there is a spill event on site, the StormFilter unit should be inspected and cleaned. Specifically, all captured pollutants and liquids from within the unit should be removed and disposed in accordance with any additional requirements that may relate to the type of spill event. Additionally, it will be necessary to inspect the filter cartridges and assess them for contamination, depending on the type of spill event it may be necessary to replace the filtration media.

### Blockages

In the unlikely event that flooding occurs upstream of the StormFilter system the following steps should be undertaken to assist in diagnosing the issue and determining the appropriate response.

1. Inspect the upstream diversion structure (if applicable) ensuring that it is free of debris and pollutants
2. Inspect the StormFilter unit checking the underdrain manifold as well as both the inlet and outlet pipes for obstructions (e.g. pollutant build-up, blockage), which if present, should be removed.

### Major Storms and Flooding

In addition to the scheduled activities, it is important to inspect the condition of the StormFilter after a major storm event. The focus is to inspect for damage and higher than normal sediment accumulation that may result from localised erosion. Where necessary damaged components should be replaced and accumulated pollutants should be removed and disposed.

### Disposal of Waste Materials

The accumulated pollutants found in the StormFilter must be handled and disposed of in a manner that is in accordance with all applicable waste disposal regulations. When scheduling maintenance, consideration must be made for the disposal of solid and liquid wastes. If the filter media has been contaminated with any unusual substance, there may be additional special handling and disposal methods required to comply with relevant government/authority/industry regulations.

## Maintenance Services

With over a decade and a half of maintenance experience Ocean Protect has developed a systematic approach to inspecting, cleaning and maintaining a wide variety of stormwater treatment devices. Our fully trained and professional staff are familiar with the characteristics of each type of system, and the processes required to ensure its optimal performance.

Ocean Protect has several stormwater maintenance service options available to help ensure that your stormwater device functions properly throughout its design life. In the case of our StormFilter system we offer long term pay-as-you-go contracts, pre-paid once off servicing and replacement media for cartridges.

For more information please visit [www.OceanProtect.com.au](http://www.OceanProtect.com.au)

MUSIC-*link* Report

| Project Details                 |                                 | Company Details |  |
|---------------------------------|---------------------------------|-----------------|--|
| <b>Project:</b>                 |                                 | <b>Company:</b> |  |
| <b>Report Export Date:</b>      | 09/10/2019                      | <b>Contact:</b> |  |
| <b>Catchment Name:</b>          | 09937 - 110-112 Mt Vernon Rd    | <b>Address:</b> |  |
| <b>Catchment Area:</b>          | 0.247ha                         | <b>Phone:</b>   |  |
| <b>Impervious Area*:</b>        | 100%                            | <b>Email:</b>   |  |
| <b>Rainfall Station:</b>        | 67113 PENRITH                   |                 |  |
| <b>Modelling Time-step:</b>     | 6 Mminutes                      |                 |  |
| <b>Modelling Period:</b>        | 1/01/1999 - 31/12/2008 23:54:00 |                 |  |
| <b>Mean Annual Rainfall:</b>    | 691mm                           |                 |  |
| <b>Evapotranspiration:</b>      | 1158mm                          |                 |  |
| <b>MUSIC Version:</b>           | 6.3.0                           |                 |  |
| <b>MUSIC-link data Version:</b> | 6.31                            |                 |  |
| <b>Study Area:</b>              | Penrith                         |                 |  |
| <b>Scenario:</b>                | Penrith Development             |                 |  |

\* takes into account area from all source nodes that link to the chosen reporting node, excluding Import Data Nodes

| Treatment Train Effectiveness |           | Treatment Nodes          |        | Source Nodes      |        |
|-------------------------------|-----------|--------------------------|--------|-------------------|--------|
| Node: Receiving Node          | Reduction | Node Type                | Number | Node Type         | Number |
| <b>Flow</b>                   | -0.012%   | Sedimentation Basin Node | 1      | Urban Source Node | 4      |
| <b>TSS</b>                    | 87.9%     | GPT Node                 | 1      |                   |        |
| <b>TP</b>                     | 70.8%     | Generic Node             | 1      |                   |        |
| <b>TN</b>                     | 46.8%     |                          |        |                   |        |
| <b>GP</b>                     | 100%      |                          |        |                   |        |

**Comments**

Input Data Provided As Per Manufacturer's Specifications

**Passing Parameters**

| Node Type     | Node Name                       | Parameter                     | Min  | Max  | Actual |
|---------------|---------------------------------|-------------------------------|------|------|--------|
| GPT           | 1 xEnviropod (or Eqv)           | Hi-flow bypass rate (cum/sec) | None | 99   | 0.02   |
| Receiving     | Receiving Node                  | % Load Reduction              | None | None | -0.012 |
| Receiving     | Receiving Node                  | GP % Load Reduction           | 90   | None | 100    |
| Receiving     | Receiving Node                  | TN % Load Reduction           | 45   | None | 46.8   |
| Receiving     | Receiving Node                  | TP % Load Reduction           | 60   | None | 70.8   |
| Receiving     | Receiving Node                  | TSS % Load Reduction          | 85   | None | 87.9   |
| Sedimentation | SF Chamber 8m                   | High Flow Bypass Out (ML/yr)  | None | None | 0      |
| Urban         | Carpark - 167.6m (100% Imp.)    | Area Impervious (ha)          | None | None | 0.017  |
| Urban         | Carpark - 167.6m (100% Imp.)    | Area Pervious (ha)            | None | None | 0      |
| Urban         | Carpark - 167.6m (100% Imp.)    | Total Area (ha)               | None | None | 0.017  |
| Urban         | Carpark - 937.7m (100% Imp.)    | Area Impervious (ha)          | None | None | 0.093  |
| Urban         | Carpark - 937.7m (100% Imp.)    | Area Pervious (ha)            | None | None | 0      |
| Urban         | Carpark - 937.7m (100% Imp.)    | Total Area (ha)               | None | None | 0.093  |
| Urban         | Impervious - 135.2m (100% Imp.) | Area Impervious (ha)          | None | None | 0.013  |
| Urban         | Impervious - 135.2m (100% Imp.) | Area Pervious (ha)            | None | None | 0      |
| Urban         | Impervious - 135.2m (100% Imp.) | Total Area (ha)               | None | None | 0.013  |
| Urban         | Roof - 1241.4m (100% Imp.)      | Area Impervious (ha)          | None | None | 0.124  |
| Urban         | Roof - 1241.4m (100% Imp.)      | Area Pervious (ha)            | None | None | 0      |
| Urban         | Roof - 1241.4m (100% Imp.)      | Total Area (ha)               | None | None | 0.124  |

Only certain parameters are reported when they pass validation

**Failing Parameters**

| Node Type     | Node Name                  | Parameter   | Min   | Max   | Actual |
|---------------|----------------------------|---|-------|-------|--------|
| Sedimentation | SF Chamber 8m              | Notional Detention Time (hrs)                                 | 8     | 12    | 0.467  |
| Sedimentation | SF Chamber 8m              | Total Nitrogen - k (m/yr)                                     | 500   | 500   | 1      |
| Sedimentation | SF Chamber 8m              | Total Phosphorus - k (m/yr)                                   | 6000  | 6000  | 1      |
| Sedimentation | SF Chamber 8m              | Total Suspended Solids - k (m/yr)                             | 8000  | 8000  | 1      |
| Urban         | Roof - 1241.4m (100% Imp.) | Baseflow Total Nitrogen Mean (log mg/L)                       | 0.11  | 0.11  | 0      |
| Urban         | Roof - 1241.4m (100% Imp.) | Baseflow Total Nitrogen Standard Deviation (log mg/L)         | 0.12  | 0.12  | 0      |
| Urban         | Roof - 1241.4m (100% Imp.) | Baseflow Total Phosphorus Mean (log mg/L)                     | -0.85 | -0.85 | 0      |
| Urban         | Roof - 1241.4m (100% Imp.) | Baseflow Total Phosphorus Standard Deviation (log mg/L)       | 0.19  | 0.19  | 0      |
| Urban         | Roof - 1241.4m (100% Imp.) | Baseflow Total Suspended Solids Mean (log mg/L)               | 1.2   | 1.2   | 0      |
| Urban         | Roof - 1241.4m (100% Imp.) | Baseflow Total Suspended Solids Standard Deviation (log mg/L) | 0.17  | 0.17  | 0      |

Only certain parameters are reported when they pass validation

NOTE: A successful self-validation check of your model does not constitute an approved model by Penrith City Council  
MUSIC-link now in MUSIC by eWater – leading software for modelling stormwater solutions